

in the horary rate was apparent at 16h., and as the fog became denser the observations were discontinued.

Two of the Leonids seen were as bright as Jupiter, whilst several others were as bright as, or brighter than, first magnitude stars. One of these flashed out in the north-west at 14h. 38m., traversed the path $315^{\circ}+57^{\circ}$ to $318^{\circ}+50\frac{1}{2}^{\circ}$, and left a short streak which lasted for about 30 seconds.

A few slow, yellow meteors from a radiant in Aries at $43^{\circ}+21^{\circ}$, and some swift streaking meteors from a radiant in Leo Minor at $144^{\circ}+37^{\circ}$, were also seen.

SPECTRA OF γ CYGNI, α CANIS MINORIS AND ϵ LEONIS.—In part vii. vol. cxiii. of the *Sitzungsberichte der Kais. Akad. der Wissenschaften*, Herren E. Haschek and K. Kostersitz publish the results of the reductions of the spectra of γ Cygni, Procyon and ϵ Leonis. After discussing in detail the methods of measurement and identification employed in the reduction, and the general and specific characteristics of each spectrum studied, the authors give a table of the wave-lengths and intensities of the lines for each star. The coincidences of each line with lines in the arc and spark spectra of terrestrial elements, as determined by Exner and Haschek, are also given, and in the last column of each table the "probable origins" of many of the lines are set down. Amongst the latter may be noted the rarer elements Yb, Pr, Sa, Nd, La, Pt, Wo, Gd, Eu, &c.

About 140 lines between λ 4250 and λ 4534, 190 lines between λ 4126 and λ 4550, and about 270 lines between λ 4215 and λ 4702 are given in the spectra of γ Cygni, α Canis Minoris and ϵ Leonis respectively.

SYSTEMATIC SURVEY OF DOUBLE STARS.—No. 99, vol. xvi., of the *Publications* of the Astronomical Society of the Pacific is devoted to an address on double stars read before the International Congress of Arts and Sciences at St. Louis by Prof. R. G. Aitken.

After discussing the work already performed in this field, Prof. Aitken described a systematic survey undertaken by Prof. Hussey and himself. All stars down to the ninth magnitude as given in the Bonn Durchmusterung were placed on the observing list, and the sky from the North Pole to -22° declination was equally divided for observation between the two observers.

The programme arranged for the observation of each star on the list on at least one good night, and all double stars discovered with a separation of $5''$ or less were to be measured on at least two nights and catalogued. On September 10, Prof. Hussey had discovered 1035 and Prof. Aitken more than 875 new pairs. Seventy-three per cent. of these are separated by $2''$ or less, and 142 are very close pairs in which the separation does not exceed $0''.25$. Of similar pairs to the latter the previously published catalogues do not contain 100.

Prof. Aitken has examined, during this research, more than 12,000 stars, and finds that the doubles discovered form about 3 per cent. of this total. Including those previously discovered, the ratio of double stars, with distances of less than $5''$, to the whole of the stars down to the ninth magnitude is apparently 1:18 to 1:20. This ratio is not, however, the same for all parts of the sky, for whilst in some regions observed double stars are very scarce, in others the ratio increases to about 1:8.

Other details concerning the survey, its prosecution and the reasons for carrying it out are given in Prof. Aitken's interesting paper.

REPORT OF THE YALE OBSERVATORY, 1900-4.—Dr. Elkin's reports to the board of managers of the Yale University Observatory for the years 1900-4, inclusive, occupy eight pages, and briefly describe the large amount of work performed at the observatory during that period.

Heliometer observations are the chief feature of the work and special attention has been paid to the determination of the parallaxes of stars having large proper motions. Practically all the stars in the northern hemisphere having known motions of $0''.5$, or more, have now been observed at Yale. A second triangulation of the Pleiades and determinations of the parallax of Arcturus have also been made. Another feature of the work is the photography of meteor trails, and numerous trails of meteors from the principal showers have been obtained.

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PRIZE SUBJECTS OF THE BATAVIAN SOCIETY OF EXPERIMENTAL PHILOSOPHY.

AT a recent general meeting of the Batavian Society of Experimental Philosophy of Rotterdam the following subjects were proposed for competition. The gold medal of the society, of the weight of thirty ducats, or its value, will be awarded for the best answer to one or other of the suggested questions. Answers may be written in the Dutch, French, English, German, or Latin languages, in another handwriting than that of the competitor, and must reach the secretary, Dr. G. T. W. Bremer, at Rotterdam not later than February 1, 1906.

Chemistry.—An experimental investigation of the atomic weight of an element which has not yet been satisfactorily fixed; a research on the causes of departure from Ostwald's dilution law; measurements of the osmotic pressure in solutions at concentrations corresponding with deviations from the simple gas laws; a study of the origin and physiological significance of the green pigment in the body of green articulated animals; experiments elucidating the formation and transformations of the sap in india-rubber plants; a re-investigation of the variations from the laws of electrolytic dissociation observed by Kahlenberg in 1901; an explanation of the thallioquinic test for quinine.

Physics.—An investigation of the electrical properties of some metal alloys; of the variation with temperature of the specific heat of mercury; of the specific heat of sulphur and phosphorus in their various allotropic forms; of the indices of refraction of substances showing anomalous dispersion; of the cause of phosphorescence, particularly in the case of the lower organisms.

Biology.—A description of the life-history and properties of one or several species of moulds, ferments, or bacteria which are of industrial importance; the action of sulphur and of copper salts on plant parasites, and of mineral salts on the development of fungi; the rôle of micro-organisms in the formation of humus in the soil.

Physiology.—An investigation of the permeability of red blood corpuscles to the ions of NaCl, NaNO₃, Na₂SO₄; and of the localisation of functions in the cerebellum.

Geology.—An exposition of the theory of the origin of the Netherlands; a critical investigation of the volcanoes of the East Indian Archipelago.

Civil Engineering.—Statistical investigations of the Dutch "polders"; or an investigation of one of the principal rivers of Holland.

THE PIC DU MIDI OBSERVATORY.

IN a recent number of *La Nature*, M. L. Rudaux gave an interesting account of the present condition and operations of this important mountain station. France is well provided with high level stations, and the observations from seven of them are published daily in the *Bulletin International* of the French Meteorological Office. An account of the very favourable position of the Pic du Midi station, and of the almost insuperable difficulties experienced by its original founder, General de Nansouty, was given, in considerable detail, by M. R. Radau, in his useful little work on "Mountain Observatories" (Paris, 1876), and has been summarised by Mr. A. L. Rotch in the *American Meteorological Journal*. The summit, which has an elevation of 2877 metres (the observatory being 17 metres lower), is situated on the outskirts of the Pyrenees, in lat. $42^{\circ} 56' N.$, and long. $2^{\circ} 12' W.$ of Paris, and affords one of the finest views in Europe. Towards the north an immense plain stretches as far as the eye can see, and to the north-west, on very clear days, the blue waters of the Atlantic are visible, at a distance of 160 km. It lies directly in the path of the great atmospheric disturbances which traverse the Bay of Biscay, while the summit mostly enjoys a clear and luminous atmosphere, being some 200 metres above the level at which thunderstorm clouds usually gather. These advantages early attracted the attention of astronomers and scientific men; M. F. de Plantade died in 1741 while observing at the ridge which has since taken his name.

The project of a permanent meteorological station was first mooted in 1860, and provisional observations were com-

mened by General de Nansouty and his coadjutors in 1873, at the foot of the Pic, about 2300 metres above the sea, and were continued under great hardships, and at considerable personal expense for about eight years. The present station was established in 1880, by public and private subscriptions. The accompanying illustration gives a general view of the station as it now exists. On the left the thermometer screen may be distinguished near the erection on which the anemometer and actinometer are placed; at the other end of the terrace is the equatorial building, and the apparatus for celestial photography. The magnetic instruments are placed in vaults underneath the terrace. The meteorological observations are regularly published in the annals of the Central Meteorological Office; useful predictions have been given to the inhabitants of the plains of impending thunderstorms, and of probable floods owing to the sudden melting of the snow on the mountains. Amongst the miscellaneous observations undertaken under the able direction of M. Marchand, we may specially mention those relating to the zodiacal light, to solar phenomena, and the

persons have attended the various local lectures provided, while 1000 students entered for the courses offered by agricultural colleges. The expenditure of the counties is given in detail, and presents some curious anomalies; thus the London County Council assigned to agricultural education 742*l.*, while the authorities of one of the most fertile divisions of Lincolnshire, in which agriculture is practically the only industry, voted 65*l.* for the purpose! Again, East Sussex, with a total income from the "Residue Grant" of 7773*l.*, spent 6116*l.* in grants to agricultural colleges or schools, while West Sussex, with an income of 4503*l.*, gave nothing for collegiate instruction, and was satisfied with an expenditure of 275*l.* upon horticulture and poultry keeping. Conditions vary from county to county, but differences in the needs of the agriculturist do not explain the widely different educational policy of the local authorities. Under the new committees, it is to be hoped that the unsystematic and spasmodic efforts that have been too common in the past may disappear, and though it is probable that in the

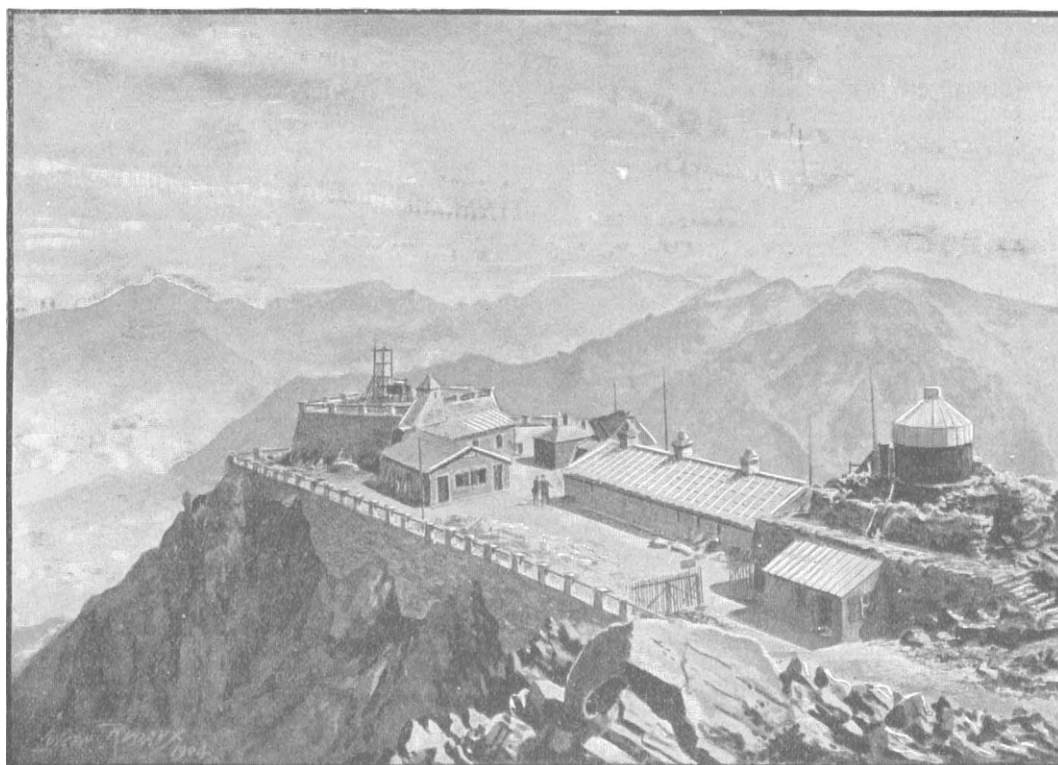


FIG. 1.—General View of the Pic du Midi Observatory in 1904.

connection of the latter with magnetic disturbances. His observations in this direction have shown that whenever a terrestrial magnetic disturbance occurs, spots or faculae exist on the central meridian of the sun. Important spectroscopic results have also been obtained respecting the atmospheres of Venus and Mars.

AGRICULTURAL NOTES.

AN important new feature of the annual report on the distribution of grants for agricultural education and research is a return giving the character of the instruction in agriculture provided by the county councils of England and Wales. The return shows that most counties are now spending considerable sums on agricultural education—altogether 88,893*l.* in 1902-3, and to this sum 9200*l.* was added by the Board of Agriculture in the form of grants to collegiate centres. It is estimated that some 22,000

immediate future less money will be spent on agricultural education, it is likely to be expended to greater advantage. The Board of Agriculture's report should be studied by all members of county education committees who are interested in agricultural education.

A piece of work which has just been completed in the library of the U.S. Department of Agriculture has greatly enhanced the value of the leading Continental agricultural journals for English-speaking students. Complete card catalogues of "Annales de la Science agronomique," "Landwirtschaftliche Jahrbücher," and "Die landwirtschaftlichen Versuchsstationen" have been prepared. Each index card gives author's name, title of article, and a brief outline of the scope of the article. The catalogues may be purchased in two series, either "author entry" sets, permitting papers to be indexed under the authors' names, or "complete" sets, furnishing two or more cards for each paper, which may then be indexed under the author's name, and also under the subject or subjects to